Serial No. :- ……..

Issued To :- ……..

Date :-……

Tender Document

For

Electronics And Telecommunication

Department

Last Date of Selling the Tender	14.12.2015 up to 04:00 PM
Last Date and Time of Submission of Tender Document	15.12.2015 up to 12:00 Noon
Date and Time of Opening of Tender of Tender Document	15.12.2015 up to 03:00 PM

Office of the Principal

Govt. Polytechnic Takhatpur

Village-Lidri, P.O- Jarondha

Takhatpur, Distt- Bilaspur (Chhattisgarh),Pin 495330

Email- principal.060.csvtu@gmail.com

Website:- www.cgdteraipur.ac.in

Schedule of items and Terms and Conditions

1. The institute wishes to procure the equipments for Labs of Electronics and Telecommunication department upto 4000000/- (Fourty Lakh Only) . Mentioned in Annexure 1.
2. The details of equipment and EMD required are given below.

ANNEXURE –I

S. No.	Lab	Item	Earnest Money Deposit	Last date of issue of Tender	last date of Submission of Tender
1	Computer Networking Lab	1. LAN Trainer Kit 2. Router ,Hub 3. Wireless Modem 4. Lan Cables 5. Fiber Optics Cable Kit	Rs 120000/- (One Lakh Twenty Thousand only)	14.12.2015 Up to 4:00 PM	15.12.2015 Up to 12:00 Noon
2	TV – Video Technique & Multimedia Lab	6. Color TV Trainer Kit 7. Black & White TV Trainer Kit 8. Video Camera Kit 9. LCD/DLP Projector 10. CCTV Camera Set a. & Microphone			
3	Advance communication lab	11. Optical Fibre Trainer Kit 12. Satellite Receiver 13. RADAR Trainer Kit 14. Photo Detector Kit 15. MTI Radar			
4	Adv. Microprocessor and Micro-controller Lab	16. 8086 Trainer Kit 17. 8051 Trainer Kit 18. PC Enter Facing Trainer Kit			
5	Antenna and Microwave Communication Lab	19. Waveforms generator 20. Gunn Oscillator Trainer Kit 21. Gunn Diode Trainer Kit 22. Klystron Tube Amplifier ,Reflex Klystron Tube Amplifier 23. Micro wave Element Isolatator Direction Coupler 24. VSWR Meter 25. Pin Diode and Pin Modulator 26. Home Antena wave Guide 27. UHF and VHF Transmitter 28. Antena Parameter Measurement Kit			
6	Audio Engg. and Acoustics Lab	29. Sound Level Meter 30. Audio Amplifier 31. PA (Public Address) system trainer 32. Stereo System ,Mic Mixture			

		Sound Mixture			
7	Microprocessor & Application Lab	33. 8085 Trainer Kit 34. Interfacing Kit	Rs 120000/- (One Lakh Twenty Thousand only)		
8	Analog Electronics Lab	35. OP-AMP Trainer Kit 36. Differential OP-AMP Kit 37. Inverting OPAMP Kit 38. Non Inverting Kit OPAMP 39. OPAMP as (Adder, Subtracted <multi, Divider,Inverter ,Integrater, Buffer , Active Filter Stable 40. Timer 555 As (Astable,Non Stable Multivibrater) 41. Analog Multi meter 42. Freq. Generator			
9	Principles of Communication Lab	43. AM Trainer Kit 44. FM Trainer Kit 45. CRO 46. PAM/PPM/PWM/ PCM Trainer Kit 47. ASK/FSK/PSK Trainer Kit 48. PCM Kit, Delta Modulation Kit 49. DSB ,SSB AM Tx /Rx Kit			
10	Power Electronics Lab	50. GTO Trainer Kit 51. DIC KIT 52. PUT Kit 53. SCR Commuting Circuit Kit 54. Snubber Circuit Kit 55. Cyclo converter 56. Chopper Circuit Kit 57. Parallel Inverter kit 58. PUT Trainer Kit			
12	Electronics Devices & Circuits Lab	59. Oscillator Trainer Kit 60. CRO 61. Hw/Fw Rectifier Trainer Kit 62. Bridge Rectifier Trainer Kit 63. UJT Trainer Kit 64. Voltage Series ,current Series Amplifier 65. RC Phase Shift Oscillator			
13	Digital Electronics Lab	66. Digital Logic GATE Trainer Kit 67. Flip Flop Trainer Kit (JK,D,T F/F) 68. Digital IC Trainer Kit 69. Demorgan Theorem Trainer Kit 70. Counter Trainer Kit 71. Logic Gates Trainer			
14	Electrical and Electronics Measurement and Instrumentation Lab	72. CRO 73. Digital Frequency Meter 74. Digital Panel meter 75. Digital Multimeter 76. Digital Storage oscilloscope			

		77. Oscillator			
15	Network analysis Lab	78. KCL & KVL Trainer Kit 79. Super Position Theorem Trainer Kit 80. Maximum Power Transfer Theorem Trainer Kit 81. Active Filter Trainer Kit			
16	Basic Electrical and Electronics Lab	82. Ohms law 83. Rheostat 84. series test, parallel test, 85. Transformer Functioning Kit			
19	Fundamentals of Electrical Engg. Lab	86. Transformer Functioning Trainer Kit 87. Various Power Supply 88. Wattmeter Trainer Kit 89. Digital Multi meter a. Display: 3½ digits LCD			
20	Electronic material and workshop	90. Various Resistor/ Capacitor/Inductor Display Trainer Kit 91. Solder/De-solder Machine & Material 92. LCR Meter 93. Various Opening Tool kit			
21	Instrumentation and Process Control Lab	94. LVDT Kit 95. Strain Guage Kit 96. Thermo Couple Kit 97. Resistance Couple Detector 98. Piezoelectic Transducer 99. LDR Kit			

3. The Tender in a sealed envelope superscripting Tender for Electronics and Telecommunication Engg. Document completed in all respect should reach to office of the Principal Govt. Polytechnic Takhatpur Distt- Bilaspur (C.G) on or before

4. The Tenderer is required to deposit the Earnest money deposit (EMD) of Rs 120000/- (One Lakh Twenty Thousand only) (Refundable),if he wishes to submit tender for items of equipments for Labs of ET&T Department. The EMD must be in form of demand draft payable to Principal Govt. Polytechnic Takhatpur (C.G) as Mentioned above along with tender document failing which there offer shall not be considered by the institute.

5. The Tender Document Can be Obtained through written request with attaching a Bank Draft of Rs 1000/- (Five Hundred Rs Only) (Non Refundable) Payable to Principal Govt. Polytechnic Takhatpur (C.G) from undersigned office. Tender document can be downloaded from website www.cgdteraipur.ac.in and apply with required fees of Rs 1000/-.

6. The unit rates should be quoted in words and figure for each item .The Tenderer should clearly mention for any taxes etc. if required .The item are required to be supplied at destination Principal Govt. Polytechnic Takhatpur Distt.- Bilaspur (C.G).The Tenderer should mention warranty period of equipment /machine clearly.

7. The supplier has to execute equipment, installation, commissioning, Demonstration and training at destination Govt. Polytechnic Takhatpur and the cost of it will be bear by supplier.

8. Payment of supplied equipment will be done only after installation and commissioning of equipment .No any advance payment will be done.

9. Equipment /machine cost, should be inclusive of packing forwarding charges.

10. The Tenderer should indicate the financial turn over during last one year. Legible photocopy or order of different origination booked during the last one year should be attached .
11. Tenderer of his representative can present on the time of opening of tender document.

12. Principal Govt. Polytechnic Takhatpur reserve the right to cancel the tender document.

13. In case of any dispute the Principal Govt. Polytechnic Takhatpur shall decide the issue and his decision will be final and shall be binding on the tenderer.

14. Each tenderer should be clearly specify that the tenderer agree to abide by the conditions of this tender document on their printed letter pad indicating here on sales tax, registration, Fax, Email, Telephone Numbers etc.
15. The details of Equipment /machine are given at Annexure –I & Annexure –II For ET&T Department.

PRINCIPAL

GOVT. POLYTECHNIC TAKHATPUR

DIST. BILASPUR (C.G.)

Annexure II

Title: Computer Networking Lab

S. No.	Name of the Equipment to be procured	Specification (Enclosure Reference)
1	LAN Trainer Kit	• 01. Three sets of onboard cabling setup for ethernet. • 02. On board parallel port direct cable connection setup. • 03. On board serial port direct cable connection setup. • 04. A 10 mbps hub is provided onboard with the circuitry exposed. • 05. The power supply circuit for Hub is provided onboard. • 06.A separate Hub is also provides so to train students for multi Hub Networking. • 07.A set of 4 exhaustive manuals covering LAN hardware & cabling, software configurations protocols, terms & definitions. • 08.The trainer comes with a cable fabrication kit to provide hands on experience on real cabling. **SPECIFICATION** **LAN HARDWARE** • 01. 10/100 Mbps Ethernet Card : 3 Nos. • 02. UPT Straight cable with Connectors : 5 mtr.x 3 + ½ mtr.x3 • 03. Coaxial Cable with connectors and termination : 10 mtr. • 04. traight Parallel port cables : 2 Nos. • 05. Straight Serial port cables : 2 Nos. • 06. 10 Mbps 8 port Hub. : 2 Nos. • 07. Set of patch cords for the Onboard cabling setup • 08. Cable fabrication kit. : 8 RJ 45 male connectors, crimping tool & 10 mtr. UTP cables **TRAINING PACKAGES AND EXPERIMENTS** **(A) LAN HARDWARE AND CABLING** • 01. Setup a network between 2-8 Computers using Hub and straight cables (WIN XP) • 02. Setup a network between two Computers without using Hub by using Cross cables (WIN XP) • 03. Multi Hub Networking (WIN XP) • 04. Setup a networking between Two computers using parallel port direct cable connection. • 05. Setup a networking between two computers using serial port direct cable Connection.
2	Router ,Hub	Ports • 1 SIC slot • 1 RJ-45 autosensing 10/100 WAN port (IEEE 802.3 Type 10BASE-T, IEEE

		802.3u Type 100BASE-TX);Duplex: half or full • 4 RJ-45 autosensing 10/100 LAN ports (IEEE 802.3 Type 10BASE-T, IEEE 802.3u Type 100BASE-TX);Duplex: half or full Throughput up to 160 Kpps (64-byte packets) Routing table size 10000 entries (IPv4), 10000 entries (IPv6) Power and operating requirements Input voltage 100-120/200-240 VAC Operating temperature range 0 to 40°C
3	Wireless Modem	. Supports HSDPA and UMTS on 850/1900/2100 MHZ,Quad-band class 12 EDGE/GPRS on 850/900/1800/1900MHZ . Download up to 7.2 Mbps on HSDPA and UMTS capable networks,and upload up to 2 Mbps . EDGE data up to 236.8Kpbs . 8G MicroSD memory expansion . Plug and Play through ..
4	Lan Cables	PVC shielded twisted pair UTP/FSTP LAN (Computer) cable Conductor Type Copper Insulation PVC Range:- * CAT 5 * CAT6 * CAT 5E (FSTP)
5	Fiber Optics Cable Kit	Technical SPECIFICATION:"Fiber Optic Trainer Kit" (Model: iDC_109_Link_TDM) Transmitter: 1 Nos Fiber optics LED i) Peak wavelength of emission 660 nm Red visible (IF-E97 or SFH-756). Receiver:2 Nos. Fiber Optic Photo Detector i) Photo detector IF-D91 [SFH-250V] is capable of 100Mbps data rates. They also can be used in analog video links with bandwidths up to 70 MHz Modulation Techniques : (i) Direct Intensity Modulation (ii)Time

Title: TV – Video Technique & Multimedia Lab

S. No.	Name of the Equipment to be procured	Specification (Enclosure Reference)
6	1. Color TV Trainer Kit	a. System: CCIR-B-PAL-G, 625 lines. b. Power Supply : 230V+15%AC, 50Hz c. Regulation range :195V AC to 265 AC. d. Power consumption :70 watts. e. Gain Limited sensitivity : 60 Db for Video 30 Db for Audio f. Sound output : 5.0 watts maximum g. Picture Tube Size: 53cms (Diagonal) full Flat square tube FFST h. Tuner Channels: VHF2 to 12 UHF 21 to 68, S-band & hyper-band i. Tuner Channel Positions: 106 Channel positions. j. Program memory : 90 Programs.

		k. On screen display for setting of all controls e.g. Volume, Brightness, Contrast, Colour, Channel and band selection tuning l. Remote Controller should be in trainer form. m. Audio-Video In and out sockets. n. Section : Operating unit & Tuner, Remote Receiver, Video I.F. , sound. o. controls : Volume, Brightness, Contrast, Colour. Channel & band selection, Tuning. p. Remote Control functions : Volume, Brightness, Contrast, colour, Channel selection, Audio mute. q. Distortion : 10 to 15% in Live program due to expanded P.C.B. 1. trainer P.C.B. 2. picture tube fitted in moulded cabinet. The complete circuit of remote colour TV should be printed on single Board. All parts should be soldered on single pin tag for easy replacement and fault creation. Fault creation facilities should be provided by Switches and by changing parts.A detail manual of colour TV should be provided. A Manual having Detailed practical.
7	Black & White TV Trainer Kit	**Technical Specifications:** **CCIR Standards:** **Lines :** 625 **Picture IF :** 38.90 MHz **Sound IF :** 33.40 MHz **Video Band Width :** 6 MHz **Inter carrier sound IF :** 5.5 MHz **Channels :** 100 **Band III :** 5 to 12 **Aspect Ratio :** 4:3 **Types of Modulation** **Picture :** Amplitude Modulated **Sound :** Frequency Modulated **Name of Section :** Tuner, Horizantal, vertical, vision, sound & EHT **Power Supply :** SMPS **EHT unit :** BD 115 and BU 205 **Video output :** BD 114.transistor **Vertical output :** IC 2130 **Horizontal oscillator :** IC CA 920 **Vision IF :** IC CA 3068 **Tuner :** Electronic Tuning **Sound IF and Audio :** IC 1190 Test points and controls should be available at the respective points in the stage-wise and circuit Diagrams of each section are printed on the PCB.

		Housing: It should be housed is an elegant metal cabinet **Power:** 230VAC - Mains operated
8	Video Camera Kit	Wireless camera kit 2. 4 Ghz Wireless Camera Kit, USB DVR 4ch 1 mini pinhole camera for surveillance. Specifications : * Imaging sensor : 1/3" CMOS * CMOS total pixels : Pal 628 x 582, NTSC 510 x 492 * Horizontal resolution : 380 TV lines * View angle : 62 * Minimum illumination : 1. 5 Lux / F1. 5 * Gain control : automatic * Frequency : ISM 2, 400MHz ~ 2, 483MHz 4CH * Transmission power : 10mW * Modulation mode : fM * Bandwidth : 18MHz
9	LCD/DLP Projector	Brightness4300 ANSI Lumens (Max.)Throw ratio1.28 (wide) -1.536 (tele) Projection screen size At 1.2m (3.94 ft) distance, diagonal projection image size of 0.92m (36.3).Projection distance At 10m (32.81 ft) distance, diagonal projection image size of 9.2m (362).Lamp1.2m ~ 10m (3.94 ft ~ 32.81 ft)Number of pixels Philips 300W user-replaceable lamp Up to 2, 000 hours Typical and Up to 2, 500 hours Eco-Mode Contrast ratio WXGA (1280 x 800)Displayable colors2000:1
10	CCTV Camera Set & Microphone	1. System : Colour PAL B/G 2. Power supply : 12 V DC 3. Resolution : 420 TV Lines- Horizontal 4. CCD Image Sensor : 1/3" Image format 5. Gray Scale : Minimum 10 steps 6. Video Output : 1.0 Vpp, 75 Ohms, RCA Socket. 7. External Arrangement : Hor. 350°, Ver. 90° 8. Gamma Correction : 0.45 1. Type : Condenser 2. Frequency Range : 20 Hz to 10 KHz 3. System : Omni directional 4. Sensitivity : 68 dB + 3 dB 1. Type : 7“ SVGA LCD Monitor 3. Inputs : Audio/Video Inputs - RCA sockets Standard (mm)7.4 x 7.4 Active Area (mm) 11.8 x 8.9 mm Active Area (mm2 Accessories: A Manual having practicalS.CCD specs: Array Size (pixels) 1600 x 1200 Pixel Size (microns) 105

Title: Advance Communication Lab

S. No.	Name of the Equipment to be procured	Specification (Enclosure Reference)

11	Optical Fibre Trainer Kit	All analog and digital modulations and pc to pc,over 660nm, 950nm OFC,
12	Satellite Receiver (disk TV OR Setup Box)	• Low Threshold Digital Tuner, with Loop Through • MCPC/SCPC all Support (2 -45 Mb /s) • Picture in Graphic (PIG) • EPG For On Screen Channel Information • DiSEqC 1.2., 1.0 version Compatible • RS-232 Serial Port with Max. 115K Baud Rate • System Upgrading & Data Transfer via PC to Unit ro Unit to Unit • Programmable of 2000 Digital channels • Over 50 satellite/ 1000 TP Programmable • Auto Channel Search & Save Function • Network Search Available • Manual PID Insertion and Scan Function • 3 Favorite Channel Lists • Channel List Edit Function • Tele - Text & sub - Title Support • Quick Channel Zapping <1 Second • 1Last Channel Memory • Event Timer Parental Lock for Channel & Menu • 4:3, 16:9 Screen Auto Selection • 12 Language OSD Menus (English, German, French, ltalian, Spanish , Arabic, Turkish, Portuguese, Russian,) • SMPS Power Supply (85-260V, 50/60Hz, 25W Max).
13	RADAR Trainer Kit	Microwave Transceiver Type : MMIC tranciever with parabolic dish antenna. Antenna Size : 30cm dia with f/d 0.3 Frequency : 10.5 GHz DRO stabilized Output Level : 0 dBm typical Sensitivity : -70dBm typical Output : PC Compatible Software Speed Display : Display in km/hr, miles/hr, m/s, rpm, event, KHz Frequency set : gate time selectable from 10 ms to 1000ms and frequency threshold selectable from 1mV to 1000mV Oscilloscope Oscilloscope : Real time with digital storage Display setting : Both X and Y position adjustable Volts/div : Adjustable Time Base : Adjustable Trigger : Auto Fast Fourier transform FFT : Real time Simultaneous speed and frequency display with cursor measurement Scanwidth : Selectable in steps

		Settings Activity Log : User defined Start and Stop Event Display : Peak to peak voltage display Annunciation : audio & visual Alarm : Adjustable threshold with Event counting : With reset to zero Speed Factor : User settable Hz/(Km/hr) Counter : In built frequency counter in GUI Audio in/out : Volume settings; alarm On/Off Settings Accessories : Tuning Fork, Buzzer, Turbine Fan, Pendulum, Reflector Panel Moving Target Emulator Range : 0 to 1000km/hr Random Noise Jammer Stealth accessory : RAM Cones, Sheets, Paints Scale models : F117 stealth fighter, B2 Bomber Reference targets : Corner reflector, Flat plate, Sphere - Metallic .
14	Photo Detector Kit	Range: 400 mm...
15	MTI Radar	- system - One (1) horn antenna for a gain of 21,4 dBi. (replacing the horn antennae of the base module) - One (1) hand controller - One (1) reflector - Four (4) feet - One (1) Laptop for control and analysis including operating system and the processing, analysis, visualization and recording software & accesories

Title: Advance Microprocessors & Microcontrollers Lab

S. No.	Name of the Equipment to be procured	Specification (Enclosure Reference)
16	8086 Trainer Kit 8086 MP. Kit with Inbuilt Assembler microprocessor kit with LCD display	8086/8088 CPU operating at 2.5/5MHz 8086 Processor can be replaced by 8088 Processor On-board sockets should be provided to facilitate the use of 8087 Coprocessorand 8089 I/O Processor 16K bytes of RAM using two nos. of 6264 with Battery Backup expandable up to 256KB 16K bytes of powerful monitor EPROM using two nos. of 27512 72 I/O lines through 3 nos. of 8255 brought at 26 Pins FRC Connector to interface with IC-XX Series 16 bit Timer/Counter through 8253 brought out at 20 Pins FRC Connector RS-232C interface using 8251 brought out at 9 Pins DType Connector. On-board Interrupt controller using 8259 brought out at 20 Pins FRC Connector

		28 keys hexadecimal keyboard and eight seven segment display using 8279 Two modes of operation: -Keyboard Mode -Serial Mode Powerful Commands like Examine/Edit Memory, Examine/Edit Register, Single stepping, Execution, Block Move can be used through hex keyboard or PC serial mode Facility for Downloading/Uploading files from/to PC All address, data & control lines are available on KXT Bus 50 pin FRC Connector to interface with SC-XX Series All ICS are mounted on IC Sockets. Bare board Tested Glass Epoxy SMOBC PCB is used In-Built Power Supply of +5V/2A, ±12V/250mA Attractive Wooden enclosures of Light weight Australian Pine Wood User's Manual with sample programs
17	8051 Trainer Kit	8051 / 89C52 CPU operating @ 11.0592 MHz. _ 32K user RAM with Battery Backup using NICD Battery. _ 16K bytes of monitor EPROM. _ One memory socket should be provided for expansion upto 64K. _ 48 I/O lines using 2 Nos. of 8255 brought at 26 Pins FRC Connector. _ Three channel timer / counter using 8253. _ 20 x 2 Backlite LCD Display with 101 ASCII Keyboard. _ Two External interrupts INT0 & INT1. _ RS - 232C using RX / TX of 8051. _ Single Line Assembler / Disassembler. _ Two modes of operation: _ ASCII Keyboard Mode. _ Serial Mode. _ Powerful Commands like Examine / Edit Memory, Examine / Edit Resistor, Single stepping, Execution, Break Point can be used through ASCII keyboard or PC serial mode. _ Facility for Downloading / Uploading files from / to PC. _ All Address, Data, Control and Port lines are available on 40 Pins and 10 Pins FRC Connector. _ In - built power supply of + 5V / 1A, + 12V / 150mA. _ User's Manual with sample programs.
18	PC Enter Facing Trainer Kit	• It should be used to study basics of Analog To Digital conversion using Processors / Controllers and develop real time process control applications. • ADC-01 card incorporates monolithic CMOS 8 bit successive approximation analog to digital converter ADC-0809. • This converter features a high impedance chopper stabilized comparator, its resolution is 8 bits and conversion time is 100 secs. • It should be programmable clock oscillator that generates 100 KHz clock signal. • The PCB track design is shielded to keep low noise level in the analog paths and this card gives stable analog input readings. • The card is also protected for reverse supply polarity.

Title: Antenna & Microwave Communication Lab

S. No.	Name of the Equipment to be procured	Specification (Enclosure Reference)
19	Waveforms : generator	Sine RF Generator : 750 MHz approximately (output adjustable) Tone Generator : 1 KHz approximately

		(output adjustable) Directional Coupler : Forward & Reverse (selectable) Matching Stub : Slider type Antenna Rotation : 0-360 deg. Resolution 1 deg. Receiving Antenna : Folded dipole with reflector Detector Display : Level adjustable meter Interconnections : 2 mm Banana sockets Power Supply : 230 V, ±10% 50/60 Hz Power Consumption : 3 VA approximately Included Accessories : Detector Antenna : 1 no. Learning material : CD (Theory, procedure, reference results, etc)
20	Gunn Oscillator Trainer Kit	model freq. Range(ghz) pushing factor (mhz/v) bias voltage max. nominal power out - put(mw) temp coeff. (mhz/°c) output connector frequency adjustment wave guide flange 1 8. 2-12. 4 8 10v 10 ±0. 2 bnc(f) by micrometer rg-52u ug-39/u 2 12. 8-16. 5 12 8v 10 ±0. 4 bnc(f) by micrometer rg-91u ug-419/u
21	Gunn Diode Trainer Kit	Gunn Power Supply (Digital). b. VSWR Meter Solid State. c. Gunn oscillator. d. Pin Modulator. e. Isolator. f. Frequency meter (Direct reading). g. Variable attenuator. h. S.S. Tuner. i. Tunable probe. j. Slotted section. k. Diode Detector. l. BNC to BNC Cable.
22	Klystron Tube Amplifier ,Reflex Klystron Tube Amplifier	Operationg Voltage - 230V+/- 10%, 50Hz AC Beam supply - Voltage:200-300V continuously variable; Current: 50mA max.; Regulation: better than 0.5% for +/-10% variation in mains supply...
23	Micro wave Element Isolatator Direction Coupler	Sma directional coupler 10db coupled port from 0.5MHzto100MHz
24	VSWR Meter	Sensitivity : 0.1mV for 200W input impedance for full scale deflection. Noise Level : Less than 0.02mV Range : 0 – 60dB in 10dB steps. Input : Un-biased low and high impedance crystal biased crystal (200W and 200K) Meter Scale : SWR 1-4, SWR 3-10, dB 0-10, expand SWR 1-1.3, dB 0-2. Gain Control : Adjusts the reference level, variable range 0 - 10dB (approx.) Input Connector : BNC (F)
25	Pin Diode and Pin Modulator	should allows current to flow only in one direction and blocks the current that flows in the opposite direction. And suitable pin modulator
26	Home Antena wave Guide	Frequency range : 86 - 860 Mhz PLL for Rx Step size : 0.05, 0.1, 0.25, 0.5, 1, ...
27	UHF and VHF Transmitter	The WML 12V- 500 VHF and WML 12U- 500 UHF Class-AB Low Power T.V. Transmitter should be designed to meet the high performance standards required for color T.V. Broadcasting applications over Band III & Band IV & V Channel frequencies. The transmitter adopts the advanced trends in design such as, use of solid state Class-AB RF Power Amplifiers, modulation at IF and use of SAW (Surface Acoustic Wave) filter to determine VSB Characteristics, highly stable synthesizer and change over facility from main to standby exciter or vis a versa. The transmitter is housed in a stand alone standard 19" rack. Rack should be made up of specially designed aluminium extrusion The transmitter should have output port (1 5/8" E.I.A. Flange Connector) on top panel of rack. Input Video and Audio port are given on the back panel of the 'exciter change over unit. A 600 Watt 50 Ohms Load is provided inside the rack for terminating transmitter

		power. The transmitter should be designed to have full redundancy. Driver stages are in-built in individual Power Amplifier.
28	Antena Parameter Measurement Kit	This system consists of a wide band PLL based source and detector module working up to 3GHz, a very strdey non magnetic Transmitter and Receiver stand, Universal Antenna Mount with plug and fit assembly and radiation pattern plotting software

Title: Audio Engineering & Acoustics Lab.

<table>
<tr><th>S. No.</th><th>Name of the Equipment to be procured</th><th>Specification (Enclosure Reference)</th></tr>
<tr><td>29</td><td>Sound Level Meter</td><td>Standard Applied Iec651 Type 2, Ansi S1.4 Type 2
Frequency Range 31.5Hz - 8Khz
Measuring Level Range 30 - 130Db
Frequency Weighting A/C
Microphone Ã‚Â½ Inch Electrical Condenser Microphone
Calibration Electrical Calibration With The Internal Oscillator (1Khz Sine Wave)
Display Lcd
Digital Display 4 Digits
Resolution 0.1 Db
Display Up Data 0.5 Sec.
Times Weighting Fast (125Ms), Slow (1 Sec.)
Level Ranges Lo: 30-100Db
Hi: 65-130Db
Accuracy Ã‚Â± 1.5Db (Under Reference Conditions)
Alarm Function Over Is Shown When Input Is Out Of Range
Maximum Hold Hold Readings The Maximum Value, With Decay < 1Db/3Minutes.
Power Supply One 9V Battery, 006P Or Iec 6F22 Or Neda 1604.
Power Life About 50Hrs (Alkaline Battery)
Operation Temperature 0Ã‚Â°C To 40Ã‚Â°C (32Ã‚Â°F To 140Ã‚Â°F)
Operation Humidity 10 To 90% Rh
Storage Temperature -10Ã‚Â°C To 60Ã‚Â°C (14Ã‚Â°F To 140Ã‚Â°F)
Storage Humidity 10 To 75% Rh
Dimensions 210 (L) X 55(W) X 32 (H)Mm
Weight 230G (Including Battery)
Accessories 9V Battery, Cary Case, Instruction Manual.</td></tr>
<tr><td>30</td><td>Audio Amplifier Amplifier with 250 watt, USB drive</td><td>
<table>
<tr><td>Power Output</td><td>500W Max.: 350W RMS at 10% THD 320W RMS at 5% THD, 300W RMS at 2% THD</td></tr>
<tr><td>Output Regulation</td><td><2 dB, no load to full load at 1kHz</td></tr>
<tr><td>Input Channels</td><td>7 x Mic 0.8mV/4.7 kΩ, 2 x Aux 100mV/470 kΩ
1 x Line 1V/50kΩ</td></tr>
<tr><td>Frequency Response</td><td>50-15000 Hz ± 3dB</td></tr>
<tr><td>Signal to Noise Ratio</td><td>60dB</td></tr>
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<tr><td></td><td></td><td>
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<tr><td>Tone Controls</td><td>Bass: ± 10dB at 100Hz, Treble: ± 10dB at 10kHz</td></tr>
<tr><td>Outputs</td><td>Preamp 200mV/600Ω, 1V/1kΩ</td></tr>
<tr><td>Speaker Outputs</td><td>4Ω, 8Ω, 70V & 100V</td></tr>
<tr><td>Power Supply</td><td>AC: 220-240V 50/60 Hz DC: 36V (3 x 12V Car Battery)</td></tr>
<tr><td>Power Consumption</td><td>AC: 660VA DC BA</td></tr>
<tr><td>Dimensions</td><td>W450 x H160 x D 340 mm</td></tr>
<tr><td>Weight</td><td>15 kg</td></tr>
</table>
</td></tr>
<tr><td>31</td><td>PA (Public Address) system trainer</td><td>Signal to noise ratio : 60 dB.
Frequency response :100 Hz to 15000 Hz.
Amplifier with two mic.inputs.
One mic. & One Aux. inputs.
Power supply : 220VAC 50 Hz.
Power Output : 80 Watt RMS Max.
Tone control : Bass, Treble.
Audio Monitoring Indicators.
Output Tap for speaker matching : 4,8 &16 Ohms.
Good Quality,reliable terminal/sockets are provided at appropriate places on panel for connections / observation of waveforms.
Strongly supported by detailed Operating Instructions, giving details of Object, Theory, Design procedures, Report Suggestions and Book Reference
Weight :16 Kg. (Approx.)</td></tr>
<tr><td>32</td><td>Stereo System ,Mic Mixture ,Sound Mixture Cordless Mic)</td><td>• 6-inch woofer, 1-inch high frequency driver
• 40 watts of power from a lightweight Class D amplifier
• Built-In VHF wireless microphone system
• iPod dock with level control
• Speaker stand pole-mount receptacle, Rechargeable battery included
• 6-Inch woofer with 1-inch high frequency driver
• Channel 1: XLR-1/4 inch combo line or mic level input with phantom power
• Channel 2: 1/4 inch line or microphone level input
• 1/8 Inch stereo aux input allows for stereo line level signal</td></tr>
</table>

Title: Microprocessor & Application Lab

S. No.	Name of the Equipment to be procured	Specification (Enclosure Reference)
33	8085 Trainer Kit microprocessor kit with LCD display	* **CPU :** 8085 Microprocessor @6**.**144 MHz * **MEMORY :** Total space ON BOARD is 48KB,Comprising of 16KB monitor EPROMS and 32KB RAM. Battery backup for RAM. No expansion required. * **PERIPHERALS :** 8279 for controlling 24 feather keys (including 6 digit seven segment display). **:** 1 Timer/counter with three independtly programmable counters. **:** Two 8255 for controlling 48 I/O lines and same are brought out to FRC 50 pin connector. **:** 8251 for RS 232 C serial communication and firmware for UP/DOWN facility for IBM PC/XT/AT computer. **:** Built-in cassette interface. **:** Built-in Speaker interface.

		: Built-in EPROM programmer for 27128 operating at 12.5V. * **INTERFACING :** All buffered & demultiplexed TTL compatible signals brought on a 50 pin FRC connector including address and **SIGNALS** data control lines brought out at another 50 pin FRC connector. Several experimental interface modules can be connected to this trainer. They are ADC, DAC, Stepper motor, 8-bit switch input, 8-bit LED output, Relay interface module, etc. and many more are available.
34	Interfacing Kit (IC8255,IC8155,IC8279)	Universal IC tester It can test more than 600 IC's comprising of 74 Series, 40/45 Series * It can test Micro-processor 8085, 8086, Z80, 8051, 89c51 and Peripherals like 8255, 8279, 8253, 8259, 8251, 8155, 6264, 62256, 8288, 8284 etc. * It tests Op-amp, 555, Transistor Arrays, Analog switches, Opto couplers etc. * It tests Seven Segment Display of common cathode and common anode type * It has Auto search facility of all Digital IC's * Test by: Truth table / sequence table...

Title: Analog Electronics Lab

S. No.	Name of the Equipment to be procured	Specification (Enclosure Reference)
35	OP-AMP Trainer Kit	Built in power supply +9Vat 200mA IC Regulated & short circuit protected. Power requirement 230V Ac 250 V, 50Hz Ac. Op amp 741 Inverting & Nov inverting Configuration. All parts are soldered on signal PCB with complete circuit diagram Screen printed section wise in multi colour with multicolored test points. Accessories:- I. Manual, 2mm Patch cord
36	Differential OP-AMP Kit	Following experiments can be performed : 01. Basic operational amplifier circuit 01. Inverting amplifier 02. Non-inverting amplifier 03. Inverting A.C. amplifier 04. Non-inverting A.C. amplifier 05. High input impedance inverting amplifier 06. High input impedance non-inverting amplifier 02. SOURCE FOLLOWERS 01. Voltage Follower (Unit...
37	Inverting OPAMP Kit	Following experiments can be performed : 01. Basic operational amplifier circuit 01. Inverting amplifier 02. Non-inverting amplifier 03. Inverting A.C. amplifier 04. Non-inverting A.C. amplifier 05. High input impedance inverting amplifier 06. High input impedance non-inverting amplifier 02. SOURCE FOLLOWERS 01. Voltage Follower (Unit...
38	Non Inverting Kit OPAMP	Following experiments can be performed : 01. Basic operational amplifier circuit 01. Inverting amplifier 02. Non-inverting amplifier 03. Inverting A.C. amplifier 04. Non-inverting A.C. amplifier

		05. High input impedance inverting amplifier 06. High input impedance non-inverting amplifier 02. SOURCE FOLLOWERS 01. Voltage Follower (Unit...
39	OPAMP as (Adder, Subtracted <multi, Divider,Inverter ,Integrater, Buffer , Active Filter Stable multivibrater, Signal Generator , Oscillator)	• +12 GND -12 power supply for IC • Two 0-5 v (V 1 & V 2) variable power supply for doing experiment • Resistors of suitable values for series & feedback resistors • Digital meter with selector switch to read input (V 1 & V 2) and output • Easily stackable patch chords
40	Timer 555 As (Astable,Non Stable Multivibrater)	• **Built in power supply :** +12V DC • **Mains :** 230V AC • **Dimension :** 27CMS X 17CMS [metal cabinet] • **Weight :** 2KGS APPX
41	Analog Multi meter	Pocket size multimeter is self-contained portable test set that measures a wide range of Voltages, Currents and Resistances. This is an indispensable instrument for servicing and maintenance of electronic equipment, radio and television. The meter is so designed and its movement is heavily damped to avoid damage to the meter movement. The internal batteries measure resistance from 2 ohms upto 1 M ohms. Range : DC voltage : 0.25/10/50/250/1000V (4K ohm/V) ± 3% AC voltage : 10/50/250/500/1000V (2K ohm/V) ± 4% AC current : 0.25/10/250mA ±3% Resistance : 0-10K/1M ohm (min.2 Ohms &...
42	Freq. Generator	* Frequency Range A:100KHz~300KHz B:300KHz~1MHz C:1MHz~3.2MHz D:3MHz~10MHz E:10MHz~35MHz F:32MHz~150MHz * 3rd harmonic : up to 450MHz * Frequency Accuracy : ±Resolution ±1digit * RF output Amplitude : 100mVrms(at 35 MHz) * Amplitude Control : 0Db/20dB and fine tune * Modulation : INT.1KHz * EXT.50Hz~20KHz (at <1Vrms) * Audio Output : 1KHz(fixed),Min.1Vrms * Frequency Meter * Frequency Range * Low frequency : 10Hz~10MHz * High frequency : 10MHz~150MHz * Input Sensitivity : Less than 50mV * Max. Input Voltage : Approx. less than 3Vrms * Accuracy Low frequency : 1Hz/High frequency 10Hz * Input Impedance : Low frequency 1MW/High frequency 50MW * Operating Temperature : 00~400 C

Title: Principles of Communication Lab

S. No.	Name of the Equipment to be procured	Specification (Enclosure Reference)
43	AM Trainer Kit	Feature:**The board consists of the following built-in parts:** 1. IC REGULATED POWER SUPPLY : ± 15 DC and +5V DC at 100mA. 2. AF Modulation signal generator : Sine wave o Frequency Range : 300 Hz to 3.4 KHz o Amplitude : 0 to 5 Vpp. 3. 03. RF carrier signal oscillator. o Frequency Range : 100 KHz to 1 MHz. o Amplitude : 0 to 10 Vpp. 4. Local Oscillator : 400 KHz to 500 KHz. 5. Band Pass Filter : 452 KHz to 458 KHz. 6. DC Source Variable power supply to o see the effect of DC on the output waveform : - 5 to + 5 VDC 7. Output Audio amplifier with Volume Control. 8. Input Audio amplifier for modulating external signal from Mike or Tape recorder. 9. Duble Balanced Amplitude modulator 10. Diode detector. 11. Product detector 12. Low pass filter. 13. Power supply requirement 230V AC, 50 Hz. 14. Mains ON/OFF switch, fuse and jewel light. 15. Dynamic Microphone with 4mm Jack Pin. 16. Loud Speaker with baffle fitted in a box with two metre wire and 2mm Banana pins for connections. 17. Good Quality, reliable terminal/sockets are provided at appropriate places on panel for connections/ observation of waveforms. 18. Strongly supported by detailed Operating Instructions, giving details of Object, Theory, Design Procedures, Report Suggestions and Book References. 19. Weight : 6 Kg. (Approx.) 20. Dimension : W 412 x H 150 x D 310
44	FM Trainer Kit	**Feature:** **The board consists of the following built-in parts:** 01. **POWER SUPPLY** : ± 12DC IC Regulated power supply. 02. **FM Modulating signal generator** : Sine wave • Frequency Range : 300 Hz to 3.4 Khz • Amplitude Range : 0 to 5 Vpp. 03. **Modulator Type :** • Varactor modulator (With carrier frequency adjustment) • Reactance Modulator (With carrier frequency adjustment) 04. **Demodulator :**

		• :Detuned resonant detector. • : Quadrature detector • : Foster - Seeley Detector • : Ratio Detector • : Phase locked loop Detector 05. **Mixer/Amplifier :** • 1 No. (With gain adjustment) Allows FM input signal to be amplitude modulated by a noise input to demodulation. 06. **Low pass Filter :** • 3.4 KHz.:Cut of frequency Amplifier (with adjustable gain) 07. **VCO Circuit** : • FM Wave form demonstrate 08 **Test Point : 7**8 09. **Power supply requirement :** • : 230VAC, 50 Hz. 10. **On Board Switched Faults** : 8 Nos. 11. **On Board Amplitude limiter with Amplitude control.** 12. **Input - Output and Test points provided on board.** 13. **A self contained Trainer.** 14. **Effect of noise on the detection of FM signal may be investigated.** • Good Quality, reliable terminal/sockets are provided at appropriate places on panel for connections/ observation of waveforms. • Strongly supported by detailed Operating Instructions, giving details of Object, Theory, Design procedures, Report Suggestions and Book References. • Weight : 6 Kg. (Approx.) • Dimension : W 412 x H 150 x D 310
45	CRO	1. Power supply requirement : 230V AC, 50 Hz. 2. WITH FAULT GENERATION AND TEST POINTS ON P.C.B. 3. WITH Built in regulated Power supply - 3. WITH CRT 4. WITH SAPERATE HORIZONTAL ,VERTICAL AND POWER SUPPLY SECTIONS be printed on PCB for easy calculation. 5. Standard Accessories : 1. User Manual with practical and circuit diagrams in two copies. 2. Connecting patch cords - sufficient nos.
46	PAM/PPM/PWM/	FOR PWM The board consists of the following built-in parts:

	PCM Trainer Kit	• ± 6V D.C. at 100mA, IC regulated Power Supply internally connected • Pulse Train (Carrier) Generator based on timer IC • 50 Hz A.C. sinusoidal modulating signal obtained from stepped down transformer • Pulse Width Modulator based on timer • Pulse Width Demodulator based on operational amplifier • Adequate no. of other electronic components • Mains ON/OFF switch, Fuse and Jewel light • The unit is operative on 230V ±10% at 50Hz A.C. Mains • Adequate no. of patch cords stackable from rear both ends 2mm spring loaded plug length ½ metre • Good Quality, reliable terminal/sockets are provided at appropriate places on panel for connections/observation of waveforms • Strongly supported by detailed Operating Instructions, giving details of Object, Theory, Design procedures, Report Suggestions and Book References • Weight : 3 Kg. (Approx) • Dimension : W 340 x H 110 x D 210 FOR PCM • 5V D.C. at 100mA IC regulated power supply internally connected. • ± 15V D.C. at 100mA IC regulated power supply internally connected. • + 5V D.C. to -9V Variable D.C. output. • Built in TTL Clock Generator 33 KHz. • Modulating Signal Generator 15Hz to 300Hz. • PCM Encoder. • PCM Decoder. • Data display with LED's • Adequate no. of other electronic components. • Mains ON/OFF switch, fuse and jewel light. • The unit is operative on 230V ±10% at 50Hz A.C. Mains. • Adequate no. of patch cords stackable from rear both ends 4mm spring loaded plug length ½ metre. • Good Quality, reliable terminal/sockets are provided at appropriate places on panel for connections /observation of waveforms. • Strongly supported by detailed Operating Instructions, giving details of Object, Theory, Design procedures, Report Suggestions and Book References. • Weight : 3 Kg. (Approx.) • Dimension : W 340 x H 110 x D 210
47	ASK/FSK/PSK Trainer Kit	The board consists of the following built-in parts : 12V D.C. at 50mA, IC regulated power supply internally connected. 5V D.C. at 50mA, IC regulated power supply internally connected. • Clock Generator 200Hz to 15KHz. • 8 Bit Word Generator. • Logic Selection switches for high / low (9Nos). • Binary Counter (Divided by 16 counter). • Carrier Signal Generator 40 to 100KHz. • Amplitude Shift Key (ASK) Modulator. • Amplitude Shift Key (ASK) Demodulator. • Mains ON/OFF switch, fuse and jewel light. • The unit is operative on 230V ±10% at 50Hz A.C. Mains.

		• Adequate no. of patch cords stackable 4mm spring loaded plug length ½ metre. • Good Quality, reliable terminal/sockets are provided at appropriate places on panel for connections /observation of waveforms. • Strongly supported by detailed Operating Instructions, giving details of Object, Theory, Design procedures, Report Suggestions and Book References. • Weight : 3 Kg. (Approx.) • Dimension : W 340 x H 110 x D 210
48	PCM Kit, Delta Modulation Kit)	The board consists of the following built-in parts : • ±12V D.C. at 100mA IC regulated power supply internally connected. • Quad Op-Amp IC. • Two Up/Down counter IC. • Digital to Analog convertor DAC IC. • Quad two input NAND gate IC. • Timer IC. • Cooperator IC. • 5V D.C. at 100mA IC regulated power supply internally connected. • Potentiometer for varying amplitude of modulating signal. • Mains ON/OFF switch, fuse and jewel light. • The unit is operative on 230V ±10% at 50Hz A.C. Mains. • Adequate no. of patch cords stackable from rear both ends 4mm spring loaded plug length ½ metre. • Good Quality, reliable terminal/sockets are provided at appropriate places on panel for connections /observation of waveforms. • Strongly supported by detailed Operating Instructions, giving details of Object, Theory, Design procedures, Report Suggestions and Book References. • Weight : 3 Kg. (Approx.) • Dimension : W 340 x H 110 x D 210

49	DSB ,SSB AM Tx /Rx Kit	**FOR DSB SSB AM Transmitter Trainer**
		The board consists of the following built-in parts:
		
		1. AF Modulating signal generator : Sine wave
		  ○ Frequency Range : 300 Hz to 3.4 KHz
		  ○ Amplitude : 0 to 5 Vpp.
		2. RF carrier signal oscillator
		  ○ Amplitude : 0 to 10 Vpp.
		  ○ Frequency Range : 100 KHz to 1 Mhz.
		3. Modulators (Two Nos) : Double Balanced Amplitude modulator
		4. Ceramic Band Pass Filter : 452 KHz to 458 KHz.
		5. Band Pass Filter : 1 No.
		6. Switch faults : 8 Nos.
		7. POWER SUPPLY : ± 12DC and +5V DC IC Regulated power supply.
		8. Test points : 27 Nos.
		9. BFO Oscillator : 455 KHz.
		10. Input Audio amplifier with Volume Control for modulating external signal from Mike or Tape recorder.

		11. Output Amplifier Transmitter : (Gain adjustable) DSB (1MHz), SSB (1.445 MHz) connected to Antenna/cable. 12. Mains ON/OFF switch, fuse and jewel light. 13. Power supply requirement 230V AC, 50 Hz. 14. Dynamic Microphone with 4mm Jack Pin. 15. Good Quality, reliable terminal/sockets are provided at appropriate places on panel for connections/ observation of waveforms. 16. Strongly supported by detailed Operating Instructions, giving details of Object, Theory, Design Procedures, Report Suggestions and Book References. 17. Weight : 6 Kg. (Approx.) 18. Dimension : W 412 x H 150 x D 310 **FOR DSB SSB AM Receiver Trainer** The board consists of the following built-in parts: 01. POWER SUPPLY : ± 12DC and +5V DC IC Regulated power supply. 02. Detectors/Demodulator : 1. Diode Detector (For DSB) • : 2. Product Detector (For SSB) 03. Frequency Range : 980KHz to 1650 KHz. 04. Intermediate frequency : 455 KHz. 05. Input Circuits : • 1. RF Amplifier • : 2. Mixer • : 3. 1st Amplifier • : 4. 2nd Amplifier • : 5. Local oscillator • : 6. Envelope Detector (AGC) • : 7. Switch Fault • : 8. Product Detector • : 9. IC Regulated Power Supply • : 10. Beat frequency oscillator / 455 KHz Crystal oscillator • : 11. Output Audio Amplifier 06. Receiving media : Telescopic Antenna / cable. 07. Tuning : with variable capacitor. 08. Switched faults : 8Nos. 09. Test points : 50. 10. Power supply requirement : 230V AC, 50 Hz. 11. Mains ON/OFF switch, fuse and LED. 12. Audio Output amplifier with Volume Control. 13. Loud Speaker with baffle fitted in a box with two metre wire and 2mm Banana pins for connections. • Adequate no. of patch cords stackable from rear both ends 2mm spring loaded plug length ½ metre. • Good Quality, reliable terminal/sockets are provided at appropriate places on panel for connections/ observation of waveforms. • Strongly supported by detailed Operating Instructions, giving details of Object, Theory, Design Procedures, Report Suggestions and Book

		References. • Weight : 6 Kg. (Approx.) • Dimension : W 412 x H 150 x D 310

Title: Power Electronics Lab

S. No.	Name of the Equipment to be procured	Specification (Enclosure Reference)
50	GTO Trainer Kit	**Objective:** • To conduct the experiment of the GTO characteristics • By applying voltage to the GTO you can able to study the saturation condition • To draw its characteristics **Technical Specification :** • **Built in power supply :** +15V DC • **Mains :** 230V AC • **Dimension :** 27CMS X 17CMS [metal cabinet] • **Weight :** 2KGS APPX
51	DIC KIT	DIC Trainer fitted with a strong and steady stepper motor trainer, flow transmitter trainer, speed control of DIC motor, and A/C positioning servo system. These trainers features such as excellent functionality, low maintenance and easy installatio
52	PUT Kit	
53	SCR Commuting Circuit Kit	• Power circuit with a DC shunt motor 2SCRs/4SCRs and 2 power diodes • A circuit breaker • A bridge rectifier for field supply • 1 phase converter firing ckt • SCR converter with open/close loop with motor rpm indication, mech. Loading load regulation = 1% with tacho F/B
54	Snubber Circuit Kit	PULSE AMPLITUDE MODULATION & DEMODULATION To construct a PAM using IC timer and to observe the operation of single and dual polarity PAM these output can control a CMOS sampling switch by adding dc reference level to the input you can able to observe the single polarity PAM and by removing the dc level you able to observe single polarity PAM to observe the demodulated output using detector circuit **Technical Specifications:** • **Built in power supply :** +12VDC

		• **Mains :** 230V AC • **Dimension :** 27CMS X 17CMS [metal cabinet] • **Weight :** 2KGS APPX
55	Cyclo converter	converting single fixed frequency AC signal to Variable frequency AC signal. This is achieved by using a center tap transformer. Four different SCRs used. Appropriate snubber circuits protect these SCRs. Volt meter and Current meters for the measurement of voltage and current within the circuit.
56	Chopper Circuit Kit	• CIRCUIT BREAKER TIME INTERVAL METER Input Voltage: 230V AC , 50HZ single phase. Front Panel Indication & Controls: • Power On Switch : Provided Switch On The Timer • Key Bord : Provided Test Operation • R-S232 Port : Provided Connect The Computer • Timer Sense : Closed, Trip, C/o & Bounce Time • Display : Digital LCD Type • Output Termination : Provided To The Rear Side 3pole With Com + Close, Trip Coil Connection Features: • Fully digital micro base control key board operation • Close, trip , c-o, bounce time on key board operation • Real time and date pass word protected • Storage 100 test reading , Re- call facility • R-S 232 connected • Thermal printer for test operation print • Work on live switch yard. Induction protected Accessories: • Breaker Timer • Printing Roll • Test Probe • Input Supply Cord • Operating Manual
57	Parallel Inverter kit	Kit Working voltage:(220-240)VAC Input Voltage:30 V DC

		Output Voltage:30 V AC Output Current:1 Amps Output Frequency:0- 50Hz *Bundle Contents* **Single Phase Parallel Inverter Module** Patch cards 6A power supply card 2A Fuse Manual *Accessories* RHEOSTAT R-LOAD Value 0-200 Ohm 2 A INDUCTOR L-LOAD Value 0-120mh Multitapping - See more at: https://www.pantechsolutions.net/products/power-electronics/parallel-inverter#sthash.50NgRaWM.dpuf
58	PUT Trainer Kit	HIGH VOLTAGE TEST KIT **Technical Specification** • **Type**: 72 KV DC high voltage test kit • **Input**:230V AC 50 HZ • **Out put**:zero to 72 KV DC 10 mA **Control** • **Power on**: Provided indicator switch • **On - off**: Provided indicator push button • **Volt meter**: Show on zero to 72 KV DC • **Current meter**: Show on likege current zero to 10mA • **Protection**: LT & HT trip protection over load trip protection with indicator trip level 1, 5, 10 Ma • **Timer**: Set testing time 1min, 2min,and 5min. • **Connection**: Polarity connector probe in put & out put

Title: Electronics Devices & Circuits Lab

S. No.	Name of the Equipment to be procured	Specification (Enclosure Reference)

59	Oscillator Trainer Kit	Fixed DC supply of +5V/500mA One LED indicator to indicate Power input. On-board Circuits a. Hartley Oscillator circuit b. Colpitt's Oscillator circuit c. Blocking Oscillator circuit d. Clapp Oscillator circuit All interconnections are made using 2mm banana Patch cords.
60	CRO	1. Power supply requirement : 230V AC, 50 Hz. 2. WITH FAULT GENERATION AND TEST POINTS ON P.C.B. 3. WITH Built in regulated Power supply - 3. WITH CRT 4. WITH SAPERATE HORIZONTAL ,VERTICAL AND POWER SUPPLY SECTIONS be printed on PCB for easy calculation. 5. Standard Accessories : 1. User Manual with practical and circuit diagrams in two copies. 2. Connecting patch cords - sufficient nos.
61	Hw/Fw Rectifier Trainer Kit	Built in power supply 0-12V. 150mA continuously variable. Power supply requirement-230V-250V Ac, 10%,50Hz Semi Conductor diodes Fabricated on PCB Accessories:- I. Manual having practical details, 2mm patch cord
62	Bridge Rectifier Trainer Kit	Built in power supply 0-12V. 150mA continuously variable. Power supply requirement-230V-250V Ac, 10%,50Hz Semi Conductor diodes Fabricated on PCB Accessories:- I. Manual having practical details, 2mm patch cord
63	UJT Trainer Kit	• Kit Working voltage :(220-240)VAC • Input Voltage :110 V AC • Input Current :2A • Frequency :50/60Hz
64	Voltage Series ,current Series Amplifier	Amplifiers of model which are known for their minimum harmonic distortion and high sound clarity. These amplifiers have separate gain control for each of the 4 inputs and have frequency response of 40Hz-18, 000 Hz +-2dB. AC power supply of Single Phase 240 V, 50 Hz +- 10% is required to run these amplifiers. Technical Specification Pa-6000 Booster Amplifier Input power Supply a) AC Mains Operation b) Battery Operation Single Phase 240 v, 50 Hz +- 10%... Housing It is mounted in an elegant...
65	RC Phase Shift Oscillator	DC supply 12 V @ 500 mA * On panel circuit diagram of RC phase shift oscillator, * Required numbers of patch cords and operating manual. * Wood Box (Closed Type)

Title: Digital Electronics Lab

S. No.	Name of the Equipment to be procured	Specification (Enclosure Reference)
66	Digital Logic GATE Trainer Kit	a. Inbuilt +5V/300mA power Supply with shot circuit Protection b. input line & output lies Toggeles Switches. c. TTL Compatibility. d. Voltage Level Indication By LED's.

		e. Training manual & connecting patch cords. On Board required Integrated Chip Should demonstrates the working characteristics of basic digital gates using IC and Verification of truth table of each gate One gate of each variety (NOT, OR, AND, NOR, NAND, EX-OR, EX-NOR) - Bank of Logic Inputs – Two separate Hi/LO Inputs with Switch, LED Indicator & Output terminal respectively. - Bank of Logic Outputs – Two separate Outputs with Input Terminal & LED Indicator respectively Set of necessary patch cords - Housed in an elegant cabinet with a well spread intelligently designed multicoloured layout on the front panel - Strongly supported by a comprehensive instruction manual complete with theory and operating details - Built - in DC regulated power supply with short circuit protection & LED indication for supply "ON" to work on 230V AC Mains
67	Flip Flop Trainer Kit (JK,D,T F/F)	a. Inbuilt +5V/300mA power Supply with shot circuit Protection b. input line & output lies Toggeles Switches. c. TTL Compatibility. d. Voltage Level Indication By LED's. e. Training manual & connecting patch cords. On Board required Integrated Chip All flip-flops DC power supply +5 V, Logic level high +5V,low 0V,
68	Digital IC Trainer Kit	Dual 0-5 V on board power supply ,IC-7404,IC-7432,IC-7408,IC-7402,IC-7400,IC-7486 ,logical Gates, flip-flops, 20 PIN ZIF socket Study of basic gates and verification of their truth tables (NOT, OR, AND, NOR, NAND, EX-OR, EX-NOR) • Study and verifications of the laws of Boolean Algebra and De-Morgan's Theorems • Study of important TTL terminologies. Verification of important TTL circuit parameters • Construction and verification of various types of flip -flops using gates & IC's (RS, JK, D, T, M / SJK) • Construction and verification of various types of combinational circuits such as Half Adder, Full Adder, Half Subtractor, Full Subtractor, Even / Odd Parity Checker, Multiplexer, Demultiplexer, Binary to Gray & Gray to Binary Converters • Construction and verification of various types of Up / Down, Synchronous / Asynchronous, Ripple / Reverse, Ring, Binary, BCD & Decade Counters • Construction and verification of 4 Bit Universal Shift Register (SR / SL operation). • Study of 7 -segment display and decoder / driver DC Regulated Power Supply : 5 V / 500 mA (IC based) Clock Generators (TTL, 5V) :
69	Demorgan Theorem Trainer Kit	Demorgans Theorem DC power supply +5 V, Logic level high +5V,low 0V Built-in power supply DC +5 V @ 500 mA B. 4 Logic input switches with green LED displa C. 4 Logic output red LED display D. On panel diagram with ICs E. Required numbers of patch cords and operating manual
70	Counter Trainer Kit	Up down counter DC power supply +5 V, Logic level high +5V,low 0V,
71	Logic Gates Trainer (	• OUTPUT D.C. VOLTAGE : Fixed 5V ±1% .

	ND,NOR, NOT, NAND,Ex-OR,Ex-NOR)	• OUTPUTCURRENT : 1 Amp. • LOAD REGULATION : ±1% of the highest specified output voltage.(NO LOAD TO FULL LOAD) • LINE REGULATION (For ±10% change : less than 50 mV. in mains Voltage i.e. 230V) • RIPPLE AND NOISE : less than 5 mV. • CLOCK INPUT DEVICE : Clock pulse of 1 second. • DEBOUNCED LOGIC SWITCH (HI/LO) : Four nos. Input voltage of HI level ³ 2.25V. Input voltage of LO leve £ l 0.8V. • 4 BITS LED OUTPUT INDICATOR : Maximum input voltage less than or equal to 5V D.C. • SOLDER LESS BREAD BOARD : Bread Board having one main strip, total interconnected 640 tie points for ICs and half main strip, total interconnected 320 tie points for power supply, Clock, Input and output state. Each strip having length 173mm and accepting dia 0.56mm/24SWG recommended, use only 22-26 SWG wire for interconnections. • BASIC LOGIC GATES & : Four AND gates, Four OR gates, Four NAND gates, Four NOR gates, Six NOT FLIP FLOP UNITS gates, Dual J-K flip-flop, J.K. master/slave flip-flop & Dual D-type flip flop. • APPLICATIONS : Verification of AND, OR, NOT, NAND, NOR Gates & their truth table. Verification of Boolean Algebra. The half-adder and full-adder design. Verification of D-type flip-flop and truth table. Verification of JK flip-flop and truth table. Verify cation of Dual JK Master/Slave flip-flop and truth table.

Title: Electrical & Electronics Measurement Lab

S. No.	Name of the Equipment to be procured	Specification (Enclosure Reference)
72	CRO	1. Power supply requirement : 230V AC, 50 Hz. 2. WITH FAULT GENERATION AND TEST POINTS ON P.C.B. 3. WITH Built in regulated Power supply - 3. WITH CRT 4. WITH SAPERATE HORIZONTAL ,VERTICAL AND POWER SUPPLY SECTIONS be printed on PCB for easy calculation. 5. Standard Accessories : 1. User Manual with practical and circuit diagrams in two copies. 2. Connecting patch cords - sufficient nos.
73	Digital Frequency Meter	Voltage: 200mV to 500V * Current: 200µA to 5A * Accuracy: 0.1%
74	Digital Panel meter	meters are available in Size 96 X 96 mm. Digital Panel Meters are available in 4½ digit and 3½ digit. Technical Specifications of Digital Panel Meters : Sr. No. Description Accuracy Size 01 3½ Digital DC Voltmeter ±(0.5% rdg + 1 dgt) 48x96x90 02 3½ Digital DC Ammeter ±(0.5% rdg + 1 dgt) 48x96x90 03 3½ Digital AC...

75	Digital Multimeter	Display : 4½ digit LCD display (19999 Counts) digit LCD display 70* 50 mm, Battery 9 V, Max Display 3999, measure DCV (1000 V) ACV 750 , DCA 400mA , Resistance , Freq ,Test diode, Transistor and Continuity Digit Size : 17mm(H), CE approved., Over range Indication, '1' Most Significant Digit is shown on display., DATA HOLD facility, Auto Power Off, Polarity: Automatic (-) negative polarity indication Resistance, Diode test & Audible Continuity, Logic test, Frequency, & Duty Cycle Function. Accessories : Test Leads, Carrying Case, User Manual, Battery
76	Digital Storage oscilloscope	Bandwidth 200/300MHz Compact Oscilloscope 7" Colour Display FFT Function 2 GSa/s Sample Rate Large no. of Auto Measurements (32 nos.) Built in Multimath Function +, –, ×, FFT Cursor Measurement : Auto, Manual, Track Pass / Fail Function USB Host / Device Realtime Sample Rate 2 GSa/s (Single Channel) Equivalent Sample Rate 50 GSa/s Number of Channels 2 CH Memory Depth 24 Kpts Acquisition Modes Normal/Average/Peak Detect Average Selectable from 4 to 256 Vertical Sensitivity 2 mV/div to 5 V/div (1-2-5 Sequence) Vertical Resolution 8 bits Rise Time <1.7ns <1.2ns Input Impedance 1MV II 13pF Input Coupling DC, AC and GND Maximum Input Voltage ±400Vpp Timebase Range 2.5ns - 50s/div 1ns - 50s/div Time Base Accuracy ±100 ppm measured over 10ms interval Trigger Sources CH1, CH2, Ext, Ext /5, AC Line Trigger Modes Auto, Normal, Single Trigger Type Edge, Pulse Width, Slope, Video, Alternate Trigger Coupling AC, DC, LF rej, HF rej Auto Measure Cursor Measure Manual, Track and Auto measure mode Maths +, – , ×, FFT Digital Filter High Pass, Low Pass, Band Pass and Band Reject Waveform Interpolation Sin x/x, Linear Storage Internal 2 Group Reference Waveform, 20 Setups, 20 Waveforms USB Communication Port USB Host, USB Device, RS232, Pass/Fail output Sample Types Real Time and Equivalent Time FFT Window: Hanning, Hamming, Blackman, Rectangular Persist Off, 1 sec, 2 sec, 5 sec, Infinite Menu Display 2 sec, 5 sec, 10 sec, 20 sec, Infinite Probe Attenuator 1X, 10X Measure Display Modes Main, Window, Window Zoom, Scan, X-Y Display 7" Colour (64K) TFT-LCD

		Display Resolution 480 Horizontal x 234 Vertical pixels Power 100 - 240V AC, 45Hz - 440Hz, 50VA Max Net Weight 2.4 kg Dimensions 399 x 110.5 x 148.5 mm
77	Oscillator	OSCILLATOR 1MHZ :- Specification * FREQUENCY RANGE : 1Hz to 1 MHz in 6 Decade Range. * DIAL ACCURACY : + 3% of Range. * WAVE FROM : SINE & SQUARE WAVE. * OUTPUT VOLTAGE : * Sine Wave 0-10V in 3 Decade Step of 10V IV & 0.IV with Consciously Variable control. * Square Wave 0-15V P/P Continuously Variable. * SINE WAVE DISTORSION : Less than 0.5% from 100Hz to 100KHz. * SQUARE WAVE RISE TIME : Less than 100 nano seconds at maximum output. * SQUARE WAVE...

Title: Network Analysis Lab

S. No.	Name of the Equipment to be procured	Specification (Enclosure Reference)
78	KCL & KVL Trainer Kit	Four Digital Meters DC Volt and Current Meter. 2. DC Power Supply +12V Regulated, +5V Regulated, 0-10V Variable, 0-5V Variable. 3. One Step Down Transformer (9-0-9V). 4. Five Potentiometers (330W, 1K, 4.7K, 10K, 47K). 5. One PNP Transistor CK-100 and one NPN Transistor CL-100. 6. One FET BFW10. 7. +5V Regulator IC 7805. 8. Different types of diodes (In4007, Oa79, 6V Zener). 9. 34 Resistance of Different Values. 10.Six Capacitors of Different Values. offering Verification of KCL / KVL. High performance * Dimensional accuracy * Accurate results
79	Super Position Theorem Trainer Kit	. Four Digital Meters DC Volt and Current Meter. 2. DC Power Supply +12V Regulated, +5V Regulated, 0-10V Variable, 0-5V Variable. 3. One Step Down Transformer (9-0-9V). 4. Five Potentiometers (330W, 1K, 4.7K, 10K, 47K). 5. One PNP Transistor CK-100 and one NPN Transistor CL-100. 6. One FET BFW10. 7. +5V Regulator IC 7805. 8. Different types of diodes (In4007, Oa79, 6V Zener). 9. 34 Resistance of Different Values. 10.Six Capacitors of Different Values.With Lead, Patch Card & Manual
80	Maximum Power Transfer Theorem Trainer Kit	1. Four Digital Meters DC Volt and Current Meter. 2. DC Power Supply +12V Regulated, +5V Regulated, 0-10V Variable, 0-5V Variable. 3. One Step Down Transformer (9-0-9V).

		4. Five Potentiometers (330W, 1K, 4.7K, 10K, 47K). 5. One PNP Transistor CK-100 and one NPN Transistor CL-100. 6. One FET BFW10. 7. +5V Regulator IC 7805. 8. Different types of diodes (In4007, Oa79, 6V Zener). 9. 34 Resistance of Different Values. 10.Six Capacitors of Different Values.. With Lead, Patch Card & Manual
81	Active Filter Trainer Kit	On Board Function Generator- Output Waveform-Sine Frequency and Amplitude Adjustment is provided using Potentiometers One LED indicator to indicate Power Input. On-board Circuits a. Inverting Low Pass Filter b. High Pass Filter c. Non-Inverting Low Pass Filter d. Unity Gain Phase Shift Supply Connections to OP Amp(±12V) Internally Provided to the circuit All interconnection are made using 2mm Patch cords for interconnections.

Title: Basic Electrical and Electronics Lab

S. No.	Name of the Equipment to be procured	Specification (Enclosure Reference)
82	Ohms law	The board consists of the following built-in parts: 01. 0-15 VD.C. at 100 mA, continuously variable regulated Power Supply. 02. D.C. Voltmeter, 65mm rectangular dial to read 0-15V D.C. 03. D.C. Milliammeter, 65mm rectangular dial to read 0-50mA D.C. 04. Adequate no. of other electronic components. 05. Mains ON/OFF switch, Fuse and Jewel light. • The unit is operative on 230V ±10% at 50Hz A.C. Mains. • Adequate no. of patch cords stackable from rear both ends 4mm spring loaded plug length ½ metre. • Good Quality, reliable terminal/sockets are provided at appropriate places on panel for connections/observation of waveforms. • Strongly supported by detailed Operating Instructions, giving details of Object, Theory, Design procedures, Report Suggestions and Book References. • Weight : 3 Kg. (Approx.) • Dimension : W 340 x H 110 x D 210
83	Rheostat	• Input Voltage: 10-300V • Input Current: 0.01 to1 A / 0.05 to 5A / 0.1 to 10A • Accuracy: Class 0.5 • Resolution: Floating Decimal Point

		• Panel Dimensions: 96 X 96 X 85 mm • Auxiliary: 230 V +_ 20% • Applicable at all Power Factor
84	series test, parallel test, multimeter, mager, ammeter, voltmeter, wattmeter, earth test equipment	meters are available in Size 96 X 96 mm. Digital Panel Meters are available in 4½ digit and 3½ digit. Technical Specifications of Digital Panel Meters : Sr. No. Description Accuracy Size 01 3½ Digital DC Voltmeter ±(0.5% rdg + 1 dgt) 48x96x90 02 3½ Digital DC Ammeter ±(0.5% rdg + 1 dgt) 48x96x90 03 3½ Digital AC... Multifunction meter with TRMS measurement, measures distorted waveform up to 15thharmonic, measures upto 18 electrical parameters in a 3phase network (V, I, F, In, System KVA, I Demand, I Max Demand, kVA Demand, kVA Max Demand)
85	Transformer Functioning Kit	DIGITAL MULTI FUNCTION METER Input Voltage : 5 - 300 VInput Current : 0.01 to 1A / 0.05 to 5A / 0.1 to 10A (Any one range) Accuracy : Class 0.5 (For P.F. ± 0.02) Resolution : Floating Decimal Point Auxiliary : 230V ± 20% Display : 16 by 2 Alphanumeric LCD Parameters : V , A , P.F. , W , VA Dimension : DPM - 48 X 96 (Depth 110 mm)

Title: Fundamentals of Electrical Engg. Lab

S. No.	Name of the Equipment to be procured	Specification (Enclosure Reference)
86	Transformer Functioning Trainer Kit	Two moving iron 72 x 72 mm AC Voltameter 0 300 V One moving iron 72 x 72 mm AC Voltmeter 0 50 V Two moving iron 72 x 72 mm AC Ammeter 0 5 Amp One moving iron 72 x 72 mm AC Ammeter 0 1Amp Wattmeter single phase, dynamometer type current coil 0.4 Amp. Potential coil 250 Volt 100W Wattmeter single phase, dynamometer type current coil 4 Amp. Potential coil 250 Volt 1000W Auto transformer input 230V, output 0270V at 5 Amp MCB: 6Amp Load: Two 100W Bulb Provided for Load. & three pin Socket for external Load Provided The unit is operative on 230V ±10% at 50Hz AC Mains Set of connecting wires Strongly supported by detailed Operating Instructions, giving details of Object,

		Theory, Design procedures, Report Suggestions and Book References **Transformer**: Rating: 1 KVA Primary Voltage: 0 - 125 V, 0 - 125 V Secondary Voltage: 0 - 125 V, 0 - 125 V
87	Various Power Supply	Switching Power Supply MAIN FEATURES - High Efficiency - Single Phase and Three phase - Unversal AC / DC Input - DIN Rail, Low Profile and Enclosed types - 5W to 960W , 5 to 48VDC output - Overload and Short circuit protection built-in
88	Wattmeter Trainer Kit	Features: * Multi-functions: Watt, ACV, ACA, DCV, DCA * 18 mm, large size LCD display * LSI circuit provides high accuracy * True AC power measurement Line Voltage : 230V AC ±10%, 50 Hz Meter Constant : 1600 impulses/KWh (On LED) Display Counter : 100 impulses /KWh (On LCD) Maximum Current : 30 A Shunt : 350 mW
89	Digital Multi meter Display: 3½ digits LCD	Direct and alternating voltages from 100mV ... 1000V Direct and alternating currents from 10mA ... 10.00A * Resistances from 100mW... 40.00MW with zero correction Capacitance from 1pF ... 200.00mF with zero correction. Frequencies from 10.00Hz ... 500.0kHz Diode measurement and continuity testing Hold measurement. Relative measurement and television service, training and education. Temperature Measurement

Title: Electronics Materials & Workshop

S. No.	Name of the Equipment to be procured	Specification (Enclosure Reference)
90	Various Resistor/ Capacitor/Inductor Display Trainer Kit	Automatic component type detection: Inductor, Capacitor or Resistor. - Automatic test frequency selection: DC, 1kHz, 15kHz and 200kHz. - Inductance from 1uH to 10H.

		- Capacitance from 1pF to 10,000uF. - Resistance from 1Ohm to 2MOhm. - Inductance measurement also shows DC winding resistance. - Test frequency displayed for all measurements. - Typical accuracy of 1.5% for inductors and capacitors (see spec table for details). - Typical accuracy of 1% for resistors. - Test lead complete with gold plated 2mm plugs and sockets. - Supplied with removable gold plated hook probes.
91	Solder/De-solder Machine & Material	Sharang 604D Micro Processor Based Digital Soldering & De-Soldering Station: * Easy to handle. * Different Sized Bits & Nozzles. Material-Amtech wire roll solder in both lead and lead free.
92	LCR Meter	Digital **Lcr Meter** specifications:- Inductance(L) Capacitance/Resistance/Inductance Range Accuracy Resolution Measuring frequency 2mH ±(2.0%+5d) 1uH Approx:200Hz 20mH 10uH 200mH 100uH 2H ±(5.0%+5d) 1mH 20H ±(5.0%+15d) 10m...
93	Various Opening Tool kit (Screw Driver etc.)	Tool Kit which is used for multiple applications

Title: IPC Lab

S. No.	Name of the Equipment to be procured	Specification (Enclosure Reference)
94	LVDT Kit	□ LVDT Displacement: 19.99 mm (±10mm) □ Operating frequency: Approximately 4Khz with output of 1V AC RMS nominal □ Built-in power supplies □ Micrometer calibrating jig included □ Output Calibrated in terms of displacement on a 31/2 digit indicator with polarity indicator □ This instrument is assembled in an ergonomically designed cabinet. □ Separate output for connecting to X-Y recorder with 200mV DC FSD (±100mV) □ Operating at 230V AC single phase ±10% at 50Hz □ Working temperature at 43 ±10°C
95	Strain Guage Kit	□ 4 numbers of 350 (strain elements connected in bridge configuration. □ Strain elements cemented on fixed end of metal bar. The other end is free to move. □ Two strain gauges are mounted on one side of the strip. Two more on the other side of the strip. □ Material of the strip: stainless steel □ Length of the strain gauge foil: 10mm □ Thickness of the strip: 3.5mm □ Supporting line to leading point: 200mm □ Length of the strip: 300mm □ Width of the strip: 25mm □ Excitation voltage: 9V DC □ Built-in power supply. □ Different weights, weighing upto 1Kg supplied.

96	Thermo Couple Kit	thermocouples for measuring temperatures from 150°C to 1600°C and, are highly accurate and sensitive
97	Resistance Couple Detector	temperature measuring between -200ºC to +600ºC in this temperature range.
98	Piezoelectic Transducer	Transducer: 4 numbers of Piezo transducers placed on a jig. Selector: 4-position selector switch is used to check the output from each transducer. Output: Two separate sets of output terminals are provided. Output directly from signal conditioner, b) from sample and hold also. Jig: Included. Built-in power supply.
99	LDR Kit	Features : Instrument comprises of DC Regulated Power Supply 0-3VDC/150mA, two round meters for voltage & current measurement, LDR mounted in a metal Box, connections of Supplies & LDR brought out at 4mm Sockets. Lamp Holder with100 W Bulb & 50 cm wooden plank are given with this apparatus.

PRINCIPAL

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